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A Study to Predict the Success of Students in Plane Geometry in Worland High School, in Worland Wyoming

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A STUDY TO PREDICT THE SUCCESS OF STUDENTS IN PLANE GEOMETRY IN WORLAND HIGH SCHOOL, WORLAND, WYOMING

being

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by

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ABSTRACT

Joe S. Kienlen (M. S.: Department of Education)

Title: A STUDY TO PREDICT THE SUCCESS OF STUDENTS IN PLANE GEOMETRY IN WORLAND HIGH SCHOOL, WORLAND, WYOMING.

Master's Report directed by Dr. W. Clement Wood

The purpose of this report was to develop measurements that can be used for predicting success in Plane Geometry in the Worland High School. The specific purposes of this report were (1) to determine coefficients of correlation between Plane Geometry grades and Algebra I grades, between Plane Geometry and Algebra II grades, between Plane Geometry grades and scores on the Orleans Geometry Prognosis Test, and between Plane Geometry grades and the scores on the Henmon-Nelson Test of Mental Ability; and (2) to develop expectancy tables to predict the success of students in Plane Geometry.

Since this is a report to predict the success of a student in Plane Geometry, it was limited to approximately one hundred students who had completed one full year of Plane Geometry. These students range from sophomores to seniors who had taken Plane Geometry sometime during the school years 1958-1961.

The four predictive factors used in this report were (1) Algebra I grades, (2) Algebra II grades, (3) the Orleans Geometry Prognosis Test, and (4) the Henmon-Nelson Test of Mental Ability.

The data collected for this report were taken from the students' permanent records which are on file in the principal's office of Worland

High School. Information obtained from these permanent records were the end of the year grades for Algebra I, Algebra II, Plane Geometry, and the Henmon-Nelson Test of Mental Ability scores. The scores for the Orleans Geometry Prognosis Test were obtained from the students' personal files in the guidance office.

The data were grouped into correlation tables. The statistics obtained from each table were substituted into a correlation formula from which a single numerical value was computed for each correlation.

The same data collected for the correlations were used in tabulating expectancy tables. These tables should be useful devices for predicting and interpreting the degree of success in geometry to the students.

The correlations established from this report between geometry and other factors are as follows:

1. .78 between Plane Geometry grades and Algebra II grades.
2. .75 between Plane Geometry grades and Algebra I grades.
3. .59 between Plane Geometry grades and the Orleans Geometry Prognosis Test scores.
4. .47 between Plane Geometry grades and the Henmon-Nelson Test of Mental Ability scores.

From the correlations computed, Algebra II was found to be the best single predictor. However, all students are not required to take Algebra II as a prerequisite for Plane Geometry. Since Algebra I is required for entrance into Plane Geometry and because of the insignificant difference in their correlations, grades from Algebra I would serve equally as well as a strong predictor.

Expectancy tables were developed to give a graphic explanation of the predictions which may be made. One need only to direct his attention to the row of the table corresponding to the score a student receives in one of the predictive factors; the entries in that row show how likely the student is to attain any particular grade average.

There is no absolute way of predicting a student's success in Plane Geometry. Current materials and modern methods in mathematics have created a need for further research to be done on prediction and a need to follow up these studies to help validate effective ways of predicting success in Plane Geometry.

This abstract of approximately four hundred words is approved as to content.

SIGNED Clement Wood
Instructor in Charge of
Master's Report

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CHAPTER I

INTRODUCTION

Educators have a great responsibility of aiding and assisting students in making educational choices and decisions. The problems which face the mathematics teachers in the Worland High School would be diminished if there were some objective measurements that they could use for predicting success in future mathematics courses.

I. THE PURPOSE OF THIS STUDY

The purpose of this study is to develop measurements that can be used for predicting success in Plane Geometry in the Worland High School. The specific purposes of the study are (1) to determine the coefficients of correlation between Plane Geometry grades and Algebra I grades, between Plane Geometry grades and Algebra II grades, between Plane Geometry grades and scores on the Orleans Geometry Prognosis Test, and Plane Geometry grades and the scores on the Henmon-Nelson Tests of Mental Ability; and (2) to develop expectancy tables to predict the success of students in Place Geometry.

II. THE SIGNIFICANCE OF THIS STUDY

The mathematics program is designed by the administration and the mathematics department of Worland High School. Algebra I is offered to the freshman, Algebra II is offered the following year to the sophomores, and Plane Geometry is taken by juniors and seniors.

Many times the geometry teacher or guidance counselor will be asked such questions as 'Shall I take geometry?' 'How well do you think I will do if I have received average grades in algebra?' There being no absolute answer to these questions, the teacher and counselor gives the student his opinions based on the best available data. Rogers (14: 193-205) in 1923 points out that predictions can never be absolute. The counselor or teacher in attempting to predict the achievement of a student based on test scores should never use these scores as the only evidence of predicting success.

Students enroll in Plane Geometry for various reasons. However, students who have low reasoning ability or those students who lack interest usually drop the course after the first few weeks of school or at least at the end of the first semester.

III. THE SCOPE AND LIMITATIONS OF THIS STUDY

This study is limited to sophomores, juniors, and seniors who had completed one full year of Plane Geometry. Approximately one hundred cases were used to determine the correlations. In order to obtain this number of cases it was necessary to use the permanent records for the school years 1958 to 1961 inclusive. There was no distinction made between scores of boys and girls because of the limited number of girls who take Plane Geometry.

Two testing devices were used in this study. They are the Henmon-Nelson Test of Mental Ability which is given to all freshmen during their

first semester and the Orleans Geometry Prognosis Test which is given to them the last few weeks of their first year.

IV. PROCEDURES USED IN THIS STUDY

The number of cases involved in this study for each group is as follows: ninety-four cases were used for establishing correlations between Plane Geometry grades and Algebra I grades; seventy-nine cases were used for establishing correlations between Plane Geometry grades and Algebra II grades; ninety-four cases were used for establishing correlations between Plane Geometry grades and scores from the Orleans Geometry Prognosis Test; and ninety-four cases were used for establishing correlations between Plane Geometry grades and scores on the Henmon-Nelson Test of Mental Ability.

The grades used in this study were final grades given by the teachers in the subjects of Algebra I and II. Percentage grades have been assigned to the number grades which appeared on permanent records. The following scale describes the percentages assigned to the numerical grades:

1 - 97	2- - 86	4+ - 77
1- - 94	3+ - 85	4 - 74
2+ - 93	3 - 82	4- - 70
2 - 90	3- - 78	F - 65

Since the grades are recorded on the permanent records on a semester basis, it was necessary to arrive at a final year grade for each subject. This was done first by changing them to percentage grades and then averaging the two.

The two standardized tests, the Orleans Geometry Prognosis Test and the Henmon-Nelson Mental Ability Test, were chosen by our guidance department. Scores of these tests were collected from the files of the selected cases being used in this study.

The data collected was grouped into a table as described by Garrett (7: 139-140). The statistical data obtained from this table was substituted into this correlation formula:

$$r_{xy} = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$$

In order to derive a single numerical number to show relationship between two factors, the coefficients of correlation were determined for

1. Plane Geometry grades and Algebra I grades.
2. Plane Geometry grades and Algebra II grades.
3. Plane Geometry grades and the Orleans Geometry Prognosis Test.
4. Plane Geometry grades and the Henmon-Nelson Test of Mental Ability.

The same data collected for the correlations were used in tabulating expectancy tables. Four expectancy tables were constructed which should be useful devices for interpreting success in Plane Geometry. According to Cronbach (4: 72)--

> The expectancy table is a useful device for interpreting performance. To interpret a student's score, the counselor need only direct attention to the row of the table corresponding to the score; the entries show how likely the student is to attain any particular grade average. This explanation is more definite and more complete than can be offered by any other system of norms.

V. EXPECTED OUTCOMES OF THIS STUDY

The results obtained from this study should have practical

significance for administrators, counselors, and teachers in secondary schools. Douglass in his recent publication (6: 19-20) points out that more and more students should be enrolled in mathematics and science, and those with special aptitudes should be stimulated to a greater degree of achievement in mathematics developed along modern lines. Douglass also points out that the developments in science and mathematics have made it quite clear that there should be two or more versions of courses in mathematics and science for groups of students with different capacities, interests, and future needs. As a result of the increased emphasis being placed on mathematics, teachers and counselors should guide the students in the selection of courses on the basis of accurate data concerning their capabilities.

This study, when used with previous teachers' recommendations and counseling, should direct those students who could be failures in Plane Geometry to a class which better fits their needs. It should also serve as an instrument to encourage good students to continue with their mathematics at higher levels. What Bobbitt (3: 246) said in 1918 certainly applies today.

> We as teachers and counselors must recognize the fact that individuals differ in their natural abilities. No amount of educational labor will develop large ability on the part of those possessing low natural ability, where those with large potential capacity should have their powers fully unfolded.

The information contained in the study should be helpful in special grouping of classes. Within the classroom itself, special grouping could be emphasized. For example, those students who show high ability could

be placed in program learning, while others could continue in the traditional type learning situation.

CHAPTER II

RELATED RESEARCH

The discussion in this section centers on reviews of investigations relating to prediction of scholastic success in Plane Geometry with intelligence test scores, prognosis test scores and previous school grades.

Guilford (9: 333) emphasizes the importance of the scientific method to prediction in the following statement:

> One of the most important fruits of scientific investigations and one of the most exacting tests of any hypothesis is the ability to make predictions. Particularly is this true for the reasons that statistical reasoning is basic to all predictions. Statistical ideas not only guide us in framing statements of a predictive nature but also enable us to say something definite concerning how trustworthy our predictions are about how much error one should expect in the phenomenon predicted.

In his book, Guilford (9: 333) lists four cases of scientific prediction. They are

1. Attributes from other attributes--as when we predict incidence of criminality from sex, race, or religious creed.

2. Attributes from quantitative measurements--as when we predict criminality from scores on tests of ability or of behavior traits.

3. Measurements from attributes--as when we predict probable test scores from sex, socioeconomic status, or marital status.

4. Measurements from other measurements--as when we predict achievement in school from I.Q. test scores.

The present study is based on the last type of prediction listed--prediction of a measurement (Plane Geometry grades) from other measurements (test scores and previous school grades).

One of the earliest investigations of predicting success was made by Orleans (12: 225-246) in the years 1928-1930. In his study of several high schools in New York City, Orleans reported correlations between the Orleans Prognosis Test and teachers' grades varied from a low of .42 to a high of .78 and several of the correlations were in the low .60's. Orleans also found correlations in his study between the Otis Self-Administering Test and Geometry Prognosis Test to be .64 and the Otis Self-Administering Test and teachers' grades to be .54.

In his conclusions Orleans stated that the combination of the geometry prognosis test and the intelligence test serves as a slightly better predictor than the former one alone.

In 1934, Lee and Hughes (11: 188-199) in their report of predicting success in Plane Geometry made a study of 197 cases and compared I.Q. test scores with other factors. They established a correlation .26 between teachers' grades and the Terman Intelligence Test; .54 between the Kuhlman-Anderson Intelligence Test and the Orleans Plane Geometry Achievement Test at the end of the first semester; .31 between the Kuhlman-Anderson Intelligence Test and teachers' grades at the end of the first semester; and .44 between the Terman Group I.Q. with the Orleans Plane Geometry Achievement Test at the end of the first semester. In this study they also included a comparison of teacher's judgment ratings and previous grades. From this information, they concluded the correlations between teacher's judgment ratings and previous grades had a higher predictive value than the correlations between previous grades and other predictive tests. From their research Lee reported that in studies

that have been made to determine the comparative predictive power of the three available algebra prognosis tests, they have proved to be about equal in value, however, no comparative studies of the two available geometry prognosis test had been made at that time. The specific need for this type study was suggested by Lee for a comparative study between the Orleans Geometry Prognosis Test and the Lee Test of Geometric Ability.

In an article by Goddeyne and Nemjek (8: 283-287) in 1944, a summary is made of a study carried out at the University of Detroit in 1941. They report the results of a study begun in September of 1937 at which time both the Lee Test of Geometric Aptitude, Form A, and the Orleans Geometry Prognosis Test, Form A, were administered to approximately 200 tenth grade students who were to begin the study of Plane Geometry. The ordinary course of instruction was given to all groups. At the end of the school year the Cooperative Plane Geometry Achievement Test, Form 1937, was administered. During the school year the I.Q. of each pupil was obtained by use of the Terman Group Test of Mental Ability, Form A.

Coefficients of correlation were computed to indicate the relationship between each pair of variables. Of particular interest in this present study are the ones concerning the Orleans Prognosis Test. They indicated a correlation between achievement test scores and the Orleans test scores of .58; between teachers' grades and the Orleans test scores a correlation of .60; and between I.Q.'s and the Orleans test scores a correlation of .67. They sum up their report by stating the coefficients of correlation indicate that the Lee test scores are slightly superior

to the Orleans test scores and the Terman I.Q.'s for predicting success in Plane Geometry as measured by both teachers' grades and the Cooperative Achievement Test.

In some of the earlier studies made by Ross and Hook (15: 184-195) (1930) more than 300 coefficients of correlation from various studies concerned with relationship between intelligence and achievement in various high school subjects were made. They reported the median of coefficients of mathematics and high school grades was found to be .37. Aaron (1: 99-109) in 1946 summarized a number of studies and showed the median of coefficients between such predictors as intelligence tests and teachers' grades to be .44. This was slightly higher than the median shown by Ross and Hooks (15: 184-195) using school grades in general.

Hummer (10: 496-500) in 1936 made comparisons of I.Q. and achievement in Plane Geometry. He used scores from the Otis Group Intelligence Test and grades given by teachers. Correlation of .58 indicating a definite relationship between intelligence and achievement in Plane Geometry were reported.

Richarson (13: 310-319) reported on a similar study made in 1932 and 1933. In 1932 the Orleans Prognosis Test was administered to all second semester algebra students in the Deerfield-Shields Township High School who expected to register for Plane Geometry in the following September. The results on this test were used along with mental test results, first semester algebra grades, and teacher's estimate of ability to do Plane Geometry. At the end of the first semester in February, 1933, the grades of the 122 who registered for Plane Geometry were correlated

with the prognosis test scores. The resulting correlation coefficient of .58 indicated substantial relationship.

The high relationship between the single factor (prognosis test scores) and Plane Geometry achievement in terms of semester grades, warranted a further study of the use of this test and other factors. In the fall of 1933, following the same procedures as before, 135 beginning Plane Geometry students were studied. The predictive significance of each of these factors was determined by correlating each with the grades earned in Plane Geometry at the end of the first semester. The correlation .70 between second semester algebra grades and first semester Plane Geometry grades are the best single predictive factor. Teacher's estimate and prognostic test scores are equally good inasmuch as each correlates .67 with the criterion. The research office prognosis correlates .64 and is only slightly better for predictive purposes than are first semester algebra grades which correlate .63. The algebra prognostic test scores and I.Q.'s are equal in predictive value, but correlate only to the extent of .50 with Plane Geometry achievement. Finally, teacher's ratings on studiousness correlate .34 with first semester Plane Geometry grades.

Aaron (1: 19) in her study of the "Predictive Value of Cumulative Test Results" reported

> The findings from a review of the research concerning the efficiency of such predictors for success in geometry as intelligence tests, achievement tests, and prognosis tests, support of observations of Douglass and Kinney that 'as in the case of algebra, achievement in geometry may be best predicted from prognostic test scores and marks received in the previous school year.

For the purpose of this study, Table I has been adapted from Douglass' table (5: 500-502) which shows the coefficients of correlation between success in first year Plane Geometry and intelligence, between success in first year Plance Geometry and previous scholastic achievement, and between success in first year Plane Geometry and aptitude test scores. Table I presents a summary of available research that has been done concerning the prediction of success in Plane Geometry. Notice the significance of teachers' grades and results of intelligence and prognosis tests as predictors of success in Plane Geometry.

In the reviews of investigation dealing with prediction of achievement in the secondary school mathematics, Douglass (5: 492) concluded that--

1. Achievement in geometry may be predicted with a fair degree of accuracy only.

2. Achievement cannot be predicted satisfactorily from any one variable for the purpose of grouping or definite advice relative to taking geometry.

3. Achievement is best predicted by a combination of the following variables--a good prognostic test, I.Q. test scores and average marks in the previous year or two of school work.

Ranking these variable for prediction of success, Douglass places them in the following order:

1. Prognostic test.
2. Average marks on previous school year.
3. I.Q. scores.
4. Previous teachers' estimate in mathematical ability.
5. Mental age.
6. Achievement test or previous year's work in mathematics.
7. Chronological age.
8. Character rating.

TABLE I

COEFFICIENTS OF CORRELATION BETWEEN SUCCESS IN PLANE GEOMETRY AND VARIOUS PREDICTORS AS REPORTED BY DOUGLASS*

Author	Date	Criterion	Predictor	N	Correlation
		Section I			
		Teachers' Marks-Geometry	Intelligence Tests		
Lee & Hughes	1934	Teachers' Marks	I.Q. (Kuhlman-Anderson)	197	.31
Lee & Hughes	1934	Teachers' Marks	I.Q. (Terman)	197	.26
Orleans	1928-30	Teachers' Marks	I.Q. (Otis, S.A.)	29-117	.51 and .54
(From Summary by Brooks)	--	Marks	Intelligence Test	108	.51
Cooke-Pearson	1933	Marks	Terman Intelligence Score	53	.29
Cooke-Pearson	1933	Marks	Terman Intelligence Score	142	.48
Dickinson	1925	Marks	Pressey Mental Survey Scale	91	.43
		Section II			
		Teachers' Marks-Geometry	Prognostic Test		
Anderson	1929	Marks	Prognostic Test	310	.67
Cooke-Pearson	1933	Marks	Orleans Prognostic Test	53	.70
Cooke-Pearson	1933	Marks	Orleans Prognostic Test	142	.52
Orleans	1928-30	Teachers' Marks	Orleans Prognostic Test	29-117	16 r's .42 to .78 Ave.= .62

TABLE I (continued)

Author	Date	Criterion	Predictor	N	Correlation
		Section III			
		Teachers' Marks-Geometry	Teachers' Marks		
(From Summary by Brooks)	--	Marks	Algebra I Marks	2143	.38 to .70 Ave.= .54
Brown	1909	Marks	Algebra Marks	--	.66
Burris	1903	Marks	Algebra Marks	--	.45
Cooke-Pearson	1933	Marks	Algebra Marks	53	.39
Cooke-Pearson	1933	Marks	Algebra Marks	142	.55
Crathorne	1922	Marks	Algebra Marks	1900	.52
Rogers	1918	Marks	Algebra Marks	--	.51
Weglein	1917	Marks	Algebra Marks	--	.63
Winegarden	1929	Marks	Algebra Marks		.51

*NOTE: This table is adapted from Table II in Harl R. Douglass' article, "The Prediction of Pupil Success in High School Mathematics," The Mathematics Teacher, 28: 489-504, December, 1935.

In a more recent review of the literature in the field of prediction of success in Plane Geometry, there is a study by Blick and Braman (2: 107-115) based upon a questionnaire sent to all the principals of secondary schools in Connecticut in 1952. Ten of these questions pertained to the prediction of success in Plane Geometry. The conclusions reached from the study concerning counseling prior to enrollment in Plane Geometry were as follows:

1. The elementary algebra marks and the estimate of the student's ability by the algebra teacher were the practices used extensively in most of the schools. The general intelligence test scores and the estimate of the student's ability by the guidance counselor were also used extensively in a large percentage of the schools. Combinations of these four practices were used more often than a single practice.

2. A greater percentage of larger schools used marks more extensively than small schools.

3. A greater percentage of small and medium schools used estimates of the students ability by the algebra teacher more extensively than large schools.

4. The estimate of the student's ability by the geometry teacher was used extensively by small schools more often than by large schools.

Personnel in charge of advising students cannot afford to be too dogmatic and, on the other hand, they cannot afford to disregard the facts. Rogers' (14: 196) statement, "Predictions can never be absolute and mistakes will certainly be made. All we can do is to state whether pupil's chances of succeeding are great or small," seems to be important and applicable for anyone who might be using predictive studies.

CHAPTER III

REPORT OF THE FINDINGS

Plane Geometry is selected by roughly 10 per cent of the students of Worland High School. This selection is based upon the students' need for the course in his future educational requirements or for actual enjoyment of mathematics. As a result most of the cases selected for this study are students who have at least average or above average grades. Correlations computed from these cases will be used for future predictions of success.

Correlations were computed to determine the statistical basis for prediction of academic success in Plane Geometry from schools grades and test scores. From these correlations expectancy tables were developed. These expectancy tables give graphic interpretations of predictions.

The distribution of grades received by students in Algebra I, Algebra II, and Plane Geometry are shown in Table II. Table II shows how many students and what per cent of the cases received each grade. In Algebra I, 89 per cent of the students made a "3" or better grade. In Algebra II, 97 per cent of the students received a "3" or better grade. In Plane Geometry, 84 per cent of the students made a "3" or better grade. One of the reasons that these grades seem high may be attributed to the fact that very few failing (below 70 per cent) students ever reach Algebra II or Plane Geometry.

TABLE II

DISTRIBUTION OF GRADES RECEIVED BY STUDENTS IN ALGEBRA I, ALGEBRA II, AND PLANE GEOMETRY FOR THE SCHOOL YEARS 1958-1961

Subject	Grades I No.	%	II No.	%	III No.	%	IV No.	%	F No.	%	Total Number of Students
Algebra I	21	22	42	45	21	22	8	9	2	2	94
Algebra II	29	37	31	39	17	22	1	1	1	1	79
Plane Geometry	24	26	32	34	23	24	11	12	4	4	94

I. COEFFICIENTS OF CORRELATION

This study is designed to correlate the test scores and the grades by calculations using the coefficient of correlation formula. Descriptions of the correlations are drawn from Guilford (9: 145):

> Our interpretation of the size of r depends very much upon what we propose to do with it. . . . Interpretation is therefore largely a relative matter. . . . But taking correlations just at large, without particular regard to their use and as a general orientation, we may say that the strength of relationship can be described roughly as follows for various r's:
>
> | | | |
> |---|---|---|
> | Less than .20 | . . . . . | slight; almost negligible relationship |
> | .20 - .40 | . . . | low correlation; definite but small relationship |
> | .40 - .70 | . . . | moderate correlation; substantial relationship |
> | .70 - .90 | . . . | high correlation; marked relationship |
> | .90 -1.00 | . . . | very high correlation; very dependable relationship |

Correlations between Plane Geometry and other factors are shown in Table III. The correlations range from a high of .78 between Algebra II and Plane Geometry to a low correlation of .47 between the Henmon-Nelson Test of Mental Ability and Plane Geometry. The correlation of .75 between Algebra I and Plane Geometry is slightly below the high correlation. The correlation of .59 between the Orleans Geometry Prognosis Test and Plane Geometry is considerably higher than the low correlation. Thus, according to Guilford, the correlations .75 and .78 show high correlation and marked relationship. Correlations of .47 and .59 show moderate correlation and substantial relationships.

From the correlations computed it is apparent that the best single predictor would be the teachers' grades received in Algebra II. However,

TABLE III

CORRELATIONS OF PREDICTIVE FACTORS
WITH PLANE GEOMETRY

Predictive Factors	Correlations with Geometry
Algebra I Grades	.75
Algebra II Grades	.78
Orleans Geometry Prognosis Test	.59
Henman-Nelson Test of Mental Ability	.47

all students who enroll in Plane Geometry are not required to take Algebra II as a prerequisite. Since Algebra I is required for entrance into Plane Geometry, and because of the insignificant difference in their correlations, grades from Algebra I would serve equally as well as a strong predictor.

II. EXPECTANCY TABLES

Expectancy tables give a graphic explanation of the predictions which may be made. The tables on the following pages predict grades in Plane Geometry for students of Worland High School from previous grades in Algebra I and Algebra II, and scores on the Orleans Geometry Prognosis Test and scores on the Henmon-Nelson Test of Mental Ability. Four expectancy tables (IV-VII) were developed for prediction purposes.

The primary use of the expectancy table is to predict a student's chance of scholastic success as determined by grades and test scores. Another effective use of these tables is to provide illustrative information regarding the spread of scores or concentration of scores as in a scatter diagram.

To interpret a student's score, one need only to direct his attention to the row of the table corresponding to the score; the entries show how likely the student is to attain any particular grade average. Table IV was used as an example to illustrate the method of interpretation of the expectancy tables. The column at the left contains the Algebra II grades divided into five intervals, and the five intervals across the top represents the percentage grades in Plane Geometry. The

TABLE IV

EXPECTANCY TABLE FOR PREDICTING GRADES IN PLANE GEOMETRY FROM ALGEBRA II GRADES

Grades	Grades in Plane Geometry					Total Number of Cases in Each Interval*
	Below 70	70 - 77	78 - 85	86 - 93	94 - 100	
94 - 100			3**	31	66	29
86 - 93		7	23	57	13	30
78 - 85	11	28	44	17		18
70 - 77				100		1
Below 70	100					1

*Seventy-nine cases were used in deriving this expectancy table.

**The numbers under each grade interval in this expectancy table are percentages, and may be interpreted as the number of chances out of one hundred.

TABLE V

EXPECTANCY TABLE FOR PREDICTING GRADES IN PLANE GEOMETRY FROM ALGEBRA I GRADES

Grades	Grades in Plane Geometry					Total Number of Cases in Each Interval*
	Below 70	70-77	78-85	86-93	94-100	
94 - 100				27**	73	22
86 - 93		7	34	44	15	41
78 - 85	5	19	28	43	5	21
70 - 77	37	25	25	13		8
Below 70	50	50				2

*Ninety-four cases were used in deriving this expectancy table.

**The numbers under each grade interval in this expectancy table are percentages, and may be interpreted as the number of chances out of one hundred.

TABLE VI

EXPECTANCY TABLE FOR PREDICTING GRADES IN PLANE GEOMETRY FROM THE ORLEANS GEOMETRY PROGNOSIS TEST

Raw Scores	Grades in Plane Geometry					Total Number of Cases in Each Interval*
	Below 70	70-77	78-85	86-93	94-100	
75 and over				33**	67	3
60 - 74			4	48	48	23
45 - 59	3	13	13	53	18	32
30 - 44	10	7	53	13	17	30
Below 30	17	33	50			6

*Ninety-four cases were used in deriving this expectancy table.

**The numbers under each grade interval in this expectancy table are percentages, and may be interpreted as the number of chances out of one hundred.

TABLE VII

EXPECTANCY TABLE FOR PREDICTING GRADES IN PLANE GEOMETRY FROM THE HENMON-NELSON TEST OF MENTAL ABILITY

Raw Score	Grades in Plane Geometry					Total Number of Cases in Each Interval*
	Below 70	70-77	78-85	86-93	94-100	
130 and over				33**	67	6
120-129			17	25	58	12
110-119		12	24	48	16	42
100-109	14	8	36	21	21	28
Below 100	17	33	33	17		6

*Ninety-four cases were used in deriving this expectancy table.

**The numbers under each grade interval in this expectancy table are percentages, and may be interpreted as the number of chances out of one hundred.

last column on the right contains the number of cases in each of the five intervals. The percentages in each of the cells of the table indicate the chance in one hundred of making a particular grade. If a student's grade in Algebra II was in the 78-85 interval, his chances of making a grade in the interval 94-100 were zero; of making a grade in the interval 86-93 were 17 out of 100; of making a grade in the interval 78-85 were 44 out of 100; of making a grade in the interval 70-77 were 28 out of 100; and of making a grade below 70 were 11 out of 100.

The other expectancy tables may be similarly interpreted.

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was conducted in an attempt to evaluate the effectiveness of certain factors in predicting success in Plane Geometry of students of Worland High School, Worland, Wyoming.

Approximately one hundred students were used in collecting data for the study. Data collected were for the school years 1958-1961. This study was limited to those students who had taken the Orleans Geometry Prognosis Test, the Henmon-Nelson Test of Mental Ability, and completed a full year in Algebra I, Algebra II and Plane Geometry. The two standardized tests were administered to the students during their freshman year. The end of the year grades in Algebra I, Algebra II and Plane Geometry were used.

Coefficients of correlation were calculated from the formula and a single numerical number was obtained. This number can be used to interpret the effectiveness of the predictive factors.

The correlations found in this study for predicting success between geometry grades and the other three factors are summarized as follows:

1. .78 between Plane Geometry grades and Algebra II grades.
2. .75 between Plane Geometry grades and Algebra I grades.
3. .59 between Plane Geometry grades and the Orleans Geometry Prognosis Test.
4. .47 between Plane Geometry grades and the Henmon-Nelson Test of Mental Ability.

According to Guilford's table on page 19, the degree of correlation obtained in this study indicates that marked relationships were found in predicting success in Plane Geometry from grades received in Algebra II and Algebra I. Significant relationships were found in predicting success in Plane Geometry from scores received on the Orleans Geometry Prognosis Test and the Henmon-Nelson Test of Mental Ability. Therefore, the correlations determined in this study can be used for prediction of success in Plane Geometry at Worland High School.

The four expectancy tables (IV-VII) on pages 21 and 24 inclusive were prepared for the purpose of predicting the expected outcomes of a student in Plane Geometry. These tables should prove especially useful in interpreting previous grades in Algebra I and Algebra II, and the standardized test scores to the students of Worland High School.

II. CONCLUSIONS

Conclusions that can be drawn from this study are as follows:

1. The highest correlation was found to be between Algebra II grades and Plane Geometry grades.

2. In predicting success in Plane Geometry, Algebra II grades proved to be the best single predictor, and should be used whenever a students Algebra II grade is known.

3. Algebra I grades can be considered equally as effective in predicting success in Plane Geometry. The difference between the correlations of Algebra I and Algebra II is only .03.

III. RECOMMENDATIONS

It is recommended that:

1. The expectancy tables of this study be used for counseling students prior to enrollment in Plane Geometry.

2. The expectancy tables be used to evaluate grading procedures in Plane Geometry.

3. The guidance department select an achievement test to be given at the end of the year in Plane Geometry.

4. A follow-up study be made to determine the effectiveness of the predictions.

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